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## Summary

### Three scenarios of firms participation in business networks

#### Firm Performance and Business Networks

This research explores the relationship between firm performance and firm participation in business networks. We use integrated administrative datasets to create three measures of firm performance, i.e. productivity, sales and innovation, and three types of business networks, i.e. research and development, commercial and shared directors. We consider a firm to participate in a business network if it files a patent or trademark application with at least one other distinct firm or if it shares a director with at least one other distinct firm.

We explore three scenarios for the effect of firm participation in these business networks. Consider the following example. We observe firm A with four patent applications between 2004 to 2007. Firm A had a joint application with firm B in 2005. The three scenarios we consider include having an effect in 2005 only, having an effect in all years after 2005, i.e. between 2005 and 2007, and having an effect in the whole period, i.e. between 2003 to 2007 (see Table 1).

Table 1: Business network assumptions

Year	Application	scenario 1 year of application	scenario 2 forward effect	scenario 3 whole period
2004	1	0	0	1
2005	1	1	1	1
2006	1	0	1	1
2007	1	0	1	1

We propose an approach to impute missing data for the integrated datasets. The analysis from our imputed sample suggests there are generally positive associations between firm performance and firm participation in these three types of business networks under three scenarios.

## About this Release

We combine three administrative datasets to study the relationship between firm performance and firm participation in business networks. We explore three types of business networks including research and development (R&D), commercial and shared directors business networks. We find that in general, there are positive associations between firm performance and these three types of business networks.

## History of changes

**30/10/2020**

Updated data section to improve explanations and fixed estimation results after incorporating reviewers' comments. Main changes include:

- adding new summary tables in section 4.3, 4.4. and 4.5
- updating figures in 4.6 and section 6.
- updating modelling approach in 5.3.
- providing more discussions on the empirical results.
- adding imputation methods in Appendix B.
- updating estimation methods in Appendix C.
- updating all tables and figures in Appendix E.

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